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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,799	10/06/2003	Susan W. Zogbi	090936.0532	3698

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EXAMINER	
TOWA, RENE T	
ART UNIT	**PAPER NUMBER**
3736	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/679,799	ZOGBI ET AL.
	Examiner	Art Unit
	Rene Towa	3736

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is responsive to an amendment filed January 20, 2007. Claims 1-24 are pending. Claims 1-3, 12, 14 and 23-24 have been amended. No claim has been added or cancelled.

Claim Objections

2. The objections are withdrawn due to amendments.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1-3, 10-11, 14-16 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hansen (US Patent No. 4,618,822) in view of Young (US Patent No. 3,756,081).

In regard to claim 1, Hansen disclose(s) a system (20, 40) for a performing a remote measurement of the displacement between two adjacent objects (2,4), comprising:

a pair of sensors (10, 110; 10', 110'), each sensor (10, 110, 10', 110') having a magnetic rod 11 and a sensor coil 13;

wherein each sensor (10, 110, 10', 110') is operable to form a tuned circuit; and

an interrogator having a transmit coil (27, 27') and at least one receive coil (27, 41), transmit circuitry (21, 23; 21', 23') for delivering to the sensor coils 13 an excitation signal through a range of frequencies, and receive circuitry (31, 33; 31', 33') for receiving a response signal from the sensor coils 13;

wherein the interrogator is operable to detect a pair of peak frequencies from the sensors (10, 110; 10', 110') when the sensors (10, 110; 10', 110') are placed substantially parallel, but not attached to, each other in an environment where displacement is to be measured (see figs. 1-3; column 11/lines 26-44 & 55-64; column 12/lines 7-28, 36-39 & 41-50; column 15/lines 57-60).

In regard to claim 2, Hansen disclose(s) a system (20, 40) further comprising means (21, 21') for electrically resonating each coil 13 (see figs. 2-3).

In regard to claim 3, Hansen disclose(s) a system (20, 40) wherein each rod 11 has at least one end mount (17, 19) operable to be attached to one of the objects (2,4) (see fig. 1; column 11/lines 34-44).

In regard to claim 11, Hansen disclose(s) a system (20, 40) wherein the interrogator has digital processing circuitry (i.e. within microprocessor 25) for processing the received signal (see column 12/lines 7-11 & 36-39).

Hansen discloses a system, as described above, that teaches all the limitations of the claim except Hansen does not teach a system wherein the sensors have substantially the same resonant frequency or a mixer. However, Young discloses a system wherein the sensors have substantially the same resonant frequency and a mixer 13 to detect a shift in the peak frequencies and to determine distance between the sensors based on the shift (see fig. 1; column 1/lines 7-32, 51-58 & 61-67; column 2/lines 3-8; column 3/lines 7-12).

It would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide a system similar to that of Hansen with

sensors similar to Young since such differential arrangement enables a measurement of twice the sensitivity to be obtained (see column 2/lines 67-68; column 3/lines 1-3).

In regard to claims 14 and 23, Hansen disclose(s) a method for determining displacement between two objects, comprising the steps of:

attaching a first sensor (10, 10') to a first location (i.e. skeletal object) 2;

attaching a second sensor to a second location (i.e. skeletal object) 4;

wherein each sensor (10, 110, 10', 110') has a rod 11, a coil 13, and a capacitor 15, electrically connected such that the rod 11, the sensor coil 13, and the capacitor 15 form a tuned circuit;

interrogating the sensors (10, 110, 10', 110') with an interrogation signal; and

receiving a response signal from the sensors (see figs. 1-3; column 11/lines 26-44 & 55-64; column 12/lines 7-28, 36-39 & 41-50; column 15/lines 57-60).

In regard to claim 15, Hansen disclose(s) a method wherein the sensors are attached by being embedded within a living body (see fig. 1; column 11/lines 26-33; column 15/lines 57-60).

In regard to claim 16, Hansen disclose(s) a method wherein each sensor is attached by means of an end mount (17, 19) at one end of each sensor 10 (see fig. 1).

In regards to claim 21, Hansen discloses method further comprising the step of creating an electrical resonance of each sensor, such that the response signal has a pair of resonant frequencies (see column 12/lines 47-50).

In regard to claim 22, Hansen disclose(s) a method wherein each sensor is self-resonating in response to the interrogation step (see column 11/lines 55-64; column 12/lines 28-36).

In regard to claim 24, Hansen disclose(s) a method wherein the skeletal objects are portions of the spine (see column 11/lines 26-33; column 15/lines 57-60).

Hansen discloses a method, as described above, that teaches all the limitations of the claims except Hansen does not teach a pair of sensors that are parallel or indicate the motion of the sensors relative to each other. However, Young discloses a method as follows:

In regard to claims 14 & 23, Young disclose(s) a method for determining displacement between two objects, comprising the steps of:

attaching a first sensor to a first location;

attaching a second sensor to a second location, such that the second sensor is substantially parallel to the first sensor;

wherein each sensor has a rod (9,10), a coil (7,8), and a capacitor (5,6), electrically connected such that the rod (9,10), the sensor coil (7,8), and the capacitor (5,6) form a tuned circuit;

receiving a pair of peak frequencies that indicate the motion of the sensors relative to each other;

calculating the distance between the sensors, based on the receiving step (see fig. 1; column 1/lines 7-32, 51-58 & 61-67; column 2/lines 3-8 & 67-68; column 3/lines 1-3 & 7-12).

In regard to claim 21, Young disclose(s) a method further comprising the step of creating an electrical resonance of each sensor, such that the response signal has a pair of resonant frequencies (see column 1/lines 15-32).

Since Young teaches that object displacement can be measured either with a single sensor or a pair of sensor arrangements (see column 3/lines 7-12), it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide a method similar to that of Hansen with a pair of sensors arranged similar to that of Young in order to differentially measure the displacement (i.e. relative to each sensor) (see Young, column 1/lines 22-32; column 3/lines 7-12). Moreover, since Young teaches a double displacement wire operating differentially in conjunction with both coils, it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide a system similar to that of Hansen as modified by Young with independently moving wires since such a modification would serve the same purpose of differentially measuring the displacement of sensor coil relative to another sensor coil (see Young, column 1/lines 22-32; column 3/lines 7-12).

5. Claims 7-9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hansen ('822) in view of Young ('081) further in view of Bullara (US Patent No. 4,127,110).

Hansen as modified by Young discloses a system, as described above, that teaches all the limitations of the claim except Hansen as modified by Young does not explicitly teach sensors that are encased in a flexible sheath. However, Bullara discloses a system wherein the sensor is enclosed in a biocompatible flexible sheath 29

(see fig. 2; column 3/lines 41-44 & 48-56; column 4/lines 38-40; column 5/lines 21-31). It would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide a system similar to that of Hansen as modified by Young with biocompatible sensor encasings similar to that of Bullara in order to provide a housing structure that is not biologically reactive as it is well-known in the art. Moreover, it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide a system similar to that of Hansen as modified by Young as further modified by Bullara with sensors made or coated with a biocompatible material since such a modification would serve the same function of providing sensors that are not biologically reactive.

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hansen ('822) in view of Young ('081) further in view of Aronow et al. (US Patent No. 3,628,381).

Hansen as modified by Young discloses a system, as described above, that teaches all the limitations of the claim except Hansen as modified by Young does not explicitly teach a mutual inductance bridge. However, Aronow et al. disclose a system comprising a mutual inductance bridge connected to a coil 11 (see fig. 1). It would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide a system similar to that of Hansen as modified by Young with an inductance bridge similar to that of Aronow et al. in order to compensate for the temperature deviations in the coil (see Aronow et al., column 3/lines 26-45).

7. Claims 4-6, 13, and 17-19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hansen ('822) in view of Young ('081) further in view of Shimizu et al. (US Patent No. 4,556,886).

In regards to claims 4-6 and 17-19, Hansen as modified by Young discloses a system, as described above, that teaches all the limitations of the claim except Hansen as modified by Young does not teach transmit and receive coils in a nulling geometry. However, Shimizu et al. teach several embodiment of at least one transmit coil (4A-B; 76-77) and at least one receive coil (5; 72-75) configured in a nulling geometry (see figs. 2, 14 & 17; column 2/lines 65-68; column 3/lines 1-15; column 4/lines 14-23 & 31-40; column 6/lines 13-16; column 10/lines 62-66; column 11/lines 29-37). It would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide a system similar to that of Hansen as modified by Young with transmit and receive coil geometries similar to that of Shimizu et al. in order to obtain the displacement by measuring the phase difference between the transmit and receive coils (see Shimizu et al, column 4/lines 31-40).

In regards to claim 13, Hansen as modified by Young discloses a system, as described above, that teaches all the limitations of the claim except Hansen as modified by Young does not teach means for adjusting the resonance of the sensor. However, Shimizu et al. disclose a system comprising means 11 for adjusting the resonance of a sensor 1 (see fig. 7; column 7/lines 34-38 & 48-53). It would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to provide a system similar to that of Hansen as modified by Young with a means for adjusting the

resonance of the sensor similar to that of Shimizu et al. in order to cancel the phase difference errors due to mounting (see Shimizu et al., column 7/lines 54-60).

Response to Arguments

8. Applicant's arguments filed January 20, 2007 have been fully considered but they are not persuasive. Applicant contends that Young fails to teach distance measurement. This argument has been considered and has not been deemed persuasive.

In regards to the Applicant's argument, the Examiner respectfully traverses. In column 1, at lines 22-32, Young clearly teaches:

Preferably the oscillatory circuit forms part of an oscillator the output of which is compared with the output of another like frequency oscillator, the difference frequency impulses ***providing a digital representation of the displacement of the member.***

As such, it is clear that Young fully teaches a distance measurement (i.e. displacement of the member).

Moreover, Young further discloses in column 3, at lines 4-12:

The above ***examples of uses*** *of the invention are typical of many similar arrangements in which* ***a mechanical movement*** *is to be transduced into an electrical signal. According to which arrangement is most convenient in a particular circumstance the mechanical movement may be coupled to a single displacement wire operating in one of the coils or* ***a double displacement wire arrangement operating differentially in conjunction with both coils.***

From the latter, it is clear that the embodiments of figures 1 & 5 are not intended to be limiting. As further evidenced by claims 1-2, 4 & 6, the system of Young is not only intended for temperature measurements; instead, it is intended in circumstances where a mechanical movement or displacement is to be transduced into an electrical signal; for example, a mechanical movement of a pressure capsule (see column 2/lines 3-8).

Since Young is not bound by the embodiment of figure 5, it is clear that Young is neither limited to wires that "move dependently" contrary to the Applicant's assertion.

In view of the foregoing, the rejections over at least one of Hansen and Young are maintained.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rene Towa whose telephone number is (571) 272-8758. The examiner can normally be reached on M-F, 8:00-16:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Max Hindenburg can be reached on (571) 272-4726. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RTT